

Colorado

Following various unofficial geographic information coordination efforts in the early 1970s, and in the 1980s, the Colorado Geographic Information Coordinating Committee (GICC) was created by Executive Order on October 19, 1989. Much has been accomplished since then, including an annual report, directory, newsletter, and conference. However, GICC is without allocated resources for statewide coordination efforts. Efforts are being made to increase policy-level support and resources for these activities. Colorado's state government began working with GIS in the early 1970s in the Department of Natural Resources' (DNR) Division of Wildlife. In addition to this system and related efforts in DNR, the Department of Local Affairs and the Department of Highways have been using GIS since 1980 and 1986, respectively.

1 Origins of State Initiatives

The first GIS activities in Colorado's state government began in 1972 when the Department of Natural Resources' Division of Wildlife developed a wildlife inventory as part of the division's long-range management plan for Colorado wildlife. Later known as the Wildlife Resource Information System (WRIS), the project was designed to act as a planning tool that would facilitate data collection of wildlife population and distribution information. This data was used in a supply program to forecast future availability and use of wildlife resources. Species distributions located on 1:250,000 scale maps were digitized to obtain tabular listings of habitat area and 1:500,000 scale computer-generated maps for each of 60 species and their habitats.

House Bill 1041, (the Colorado Land Use Bill), was adopted in 1974 and helped to accelerate these efforts by supplying additional responsibilities. GIS services are a useful tool, legislators concluded, and a cooperative agreement was made between the division and the Colorado Cooperative Wildlife Research Unit at Colorado State University. In 1976, a package of computer programs was completed for data entry, storage, archiving, retrieval, display, analysis and output in hard copy

form. Subsequently, the Cooperative Wildlife Research Unit began work for the U.S. Fish and Wildlife Service (FWS) to develop their Systems Application Group Information System (SAGIS) and its resource evaluation program. Through these efforts GIS created a link between FWS's Western Energy and Land Use Team and the division's wildlife system, and the division benefited by the additional GIS capabilities that were developed by FWS.

During the late 1970s the National Aeronautics and Space Administration (NASA) began a technology transfer project with participation of the division, the Department of Agriculture, the Department of Local Affairs' (DLA) Division of Planning, Colorado's State Forest Service, and the Pueblo County Planning Commission. A 17-category land use/land cover classification of Landsat information was performed for Pueblo County. This classification was compared to an air photo-based land use/land cover map produced using the Colorado Land Use Classification System that was developed in the mid-1970s. Informal comparisons of the data sources helped to conclude that the imagery was a better source of information. Landsat imagery was analyzed for other uses in cooperation with Colorado State University.

Statewide geographic information coordination activities were initiated in the early 1970s with an Executive Order signed on July 1, 1974 entitled *The Assignment of Cartographic Responsibilities and the Creation of a State Mapping Advisory Committee (SMAC)*. This order was annually renewed from 1975 to 1978, and an annual meeting was held during each of these years. SMAC members included representatives of state agencies, regional and local governments, academic institutions, scientific and technical organizations, and federal agencies. It was chaired by Louis Campbell, State Cartographer in DLA's Division of Planning. Campbell was later instrumental in accomplishing a unique 1:50,000 scale county map series developed through a cooperative project with the U.S. Geological Survey.

The Division of Wildlife was the first user of GIS in Colorado state government, and one of the first state wildlife agencies in the country to use GIS.

Through these efforts, the need for GIS was increasingly recognized during the 1970s. In 1980, the Legislative Joint Budget Committee funded acquisition of GIS for reapportionment activities in the Division of Planning, with the expectation that the system could be used for various planning purposes in the future. During GIS implementation, the Division of Planning was abolished in DLA. Many of this division's functions, including its cartography and GIS program, were moved to DLA's Division of Local Government where it remains today. In 1983 state policy changes further reduced funding for planning purposes, and it was proposed that the cartography program be moved to the Department of Natural Resources. Budget reductions then eliminated the State Cartographer position, and in effect SMAC and the cartography program were dissolved. GIS continued to support the Division of Local Government internal needs, but with minimal resources.

Various informal efforts were initiated after 1983 to coordinate geographic information activities in the state. Many of these efforts focused on the need for state government to take a leadership role in establishing a focal point, forum and knowledge base about activities in the state. State agencies continued to express interest in using GIS. Efforts in the Division of Wildlife continued, and the Department of Highway's Division of Transportation Planning acquired GIS software in 1986. In 1986, the Governor's Office initiated an infor-

mal GIS Committee which prepared an inventory of geographic information, but the group soon disbanded due to lack of staff. Representatives of state agencies, local governments, the private sector and other citizens increasingly worked together to encourage the state effort. A presentation made to Governor Roy Romer immediately prior to his inauguration in January, 1987 suggested that he support development of a program to coordinate geographic information activities in Colorado.

Responding to this need early in 1987, the new director of the Department of Highways (DOH) volunteered to help support a statewide geographic information coordination initiative by hiring a full-time Geographic Information Coordinator to facilitate the coordination of statewide activities. The DOH director asked each agency director to supply a staff person for an interagency group in order to begin coordination efforts. The group met regularly during 1987, and information was shared and compiled about geographic information and interests, resources, and activities in the state. A Geographic Names Board was initiated and is chaired by the State Archivist. Efforts were focused on the need for an official statewide program with dedicated resources, as the current effort was without official statewide sanction. This activity included a "Governor's Forum on Geographic Information" conference held in October, 1987 with 300 attendees. A major purpose of the meeting was to determine the proper role for state government in geographic information coordination, and to encourage proactive efforts in response to growing recognition of redundant and incompatible activities. The governor and representatives of state, federal and local agencies and the private sector gave presentations about their activities, interests and needs. A report of the meeting was prepared. However, activities slowed down afterwards with the departure of the DOH director and its coordinator at the end of 1987.

During this time the state was reorganizing the leadership of information technology policy in state government. Following the legislature's abolishment of the Department of Administration's Division of Information Systems, it created the Information Management Commission (IMC). Established in 1987, it was statutorily authorized to coordinate all information technology development, including the review of all agency plans and requests. IMC did not take action regarding geographic information during the 1980s, yet increasing interest was expressed.

State agency representatives and others interested in GIS continued to work together in 1988 and 1989, culminating in the drafting of an Executive Order to make efforts official. The Executive Order was signed on October 19, 1989, establishing

the Colorado Geographic Information Coordinating Committee (GICC). The order stipulated that GICC's responsibilities include the promotion of cooperation and coordination while developing recommendations and guidelines, among other coordinating roles.

2 Coordination Efforts, Groups and Activities

Geographic information and GIS coordination activities in Colorado are conducted by the Colorado Geographic Information Coordinating Committee (GICC). Statewide information technology services are provided by the Department of Administration, and policy direction is provided by the Information Management Commission (IMC). IMC includes agency directors of some state agencies, representatives of the Senate and House and the Judiciary, and executive level representatives of some Colorado companies. Created by legislation in 1987, IMC directs all information technology development in state government, including review of all agency plans and requests. It has designated one of its members to monitor GIS developments in state government, but no official action has been taken.

The Colorado Geographic Information Coordinating Committee (GICC) was established by Executive Order in October 1989, following a long history of sporadic and largely informal coordination initiatives dating back to the early 1970s (see **Origins of State Initiatives**). The order states that the responsibilities of the committee are to "promote a spirit of cooperation between state, federal and local agencies, and the private sector in addressing geographic data and information needs and services in Colorado." GICC is directed to develop recommendations and guidelines for mapping and geographic data needs, priorities, standards, and data interchange to state and federal agencies; advise the U.S. Geological Survey (USGS) of state priorities for use of federal resources; promote coordination of programs, policies, technologies and resources to maximize opportunities and minimize duplication of effort; provide a contact point and rudimentary clearinghouse within state government for local governments and private entities with GIS concerns; and provide an annual report and recommendations to the governor as appropriate.

As stated in the order, members of the committee included executive directors or their designees from the Departments of Local Affairs (DLA), Natural Resources, Highways, Health, Administration, Agriculture and Higher Education. These designees are active members, and they decided

to include the Department of Public Safety and the Legislative Council. The order also stated that ex-officio members could be invited since participants in the state's GIS efforts included representatives of federal agencies, local governments, and the private sector. Colorado Counties, Inc., the Colorado Municipal League and the Greater Denver Chamber of Commerce were asked to make recommendations, and GICC then made appointments to represent local and private sector interests. USGS was asked to join and to represent the interests of federal agencies. The Order provided that the Department of Local Affairs (DLA) lead GICC. The chair position is currently held by the Senior Cartographer at DLA's Division of Local Government.

Subcommittees, established soon after GICC was created, worked on various plans and activities. The Strategic Planning/Direction Subcommittee worked to establish goals for GICC and it recommended the annual preparation of a state strategic workplan to "foster the effective coordination, generation and use of geographic information in Colorado." The need for resources to conduct this work was seen as "critical to all future GICC activities."

The Communications/Education Subcommittee developed written documents and conducted other work to meet its objective, as summarized below. The Federal Input/Coordination Subcommittee primarily exists to provide input to USGS about mapping recommendations. It solicited participation of a variety of entities in preparing the state's response to USGS's annual request for input regarding mapping and digital cartographic data needs.

The Data Guidelines/Technical Support Subcommittee considered various standards documents and issues, and other related federal activities. This committee recommended a document which would provide guidelines on data quality, reliability, and integrity, as well as policies on data exchange and the federal Spatial Data Transfer Standard. It was agreed that certain topics would not be addressed by the proposed guidelines, including survey control, hardware, software and operating systems. The issue of local government standards was also considered, but it was decided that mandating formal standards was not feasible until funds were available to assist localities to meet them. Future plans include the formation of a new subcommittee on survey control standards.

GICC has accomplished much since its inception. While it does not have any staff or financial resources, it serves as a forum for exchange of information which is resulting in improved coordination. It meets monthly for half a day. A public hearing was held in June, 1990. The main

theme expressed at the hearing was the need for emphasis on education in geography and GIS, and as well a need for a comprehensive approach to the coordination, development and maintenance of survey control data.

GICC also initiated a quarterly newsletter entitled *GeoNews* in January, 1990, which is co-sponsored with the Rocky Mountain Chapter of the Urban and Regional Information Systems Association. Other activities included co-sponsorship of "GIS in the Rockies," a conference held in October, 1990 in cooperation with professional societies working with geographic information. Presentations were made by state, federal and local agencies in Colorado and neighboring states, with over 200 attendees.

GICC published its first annual *Report to the Governor* in October, 1990, which reviewed GICC's progress during its first year of operation. Work was conducted to gather and distribute information about public and private geographic information activities and data resources in Colorado. A survey of public agencies resulted in the *Colorado Geographic Information Resource Directory*, published in October, 1990 and distributed at the conference. A final version was completed in March, 1991 after gathering comments and suggestions from interested persons. The directory provides details about geographic information resources available to the public from over 50 state, federal, county and city agencies, and academic institutions. A survey of GIS private sector products and services is also underway.

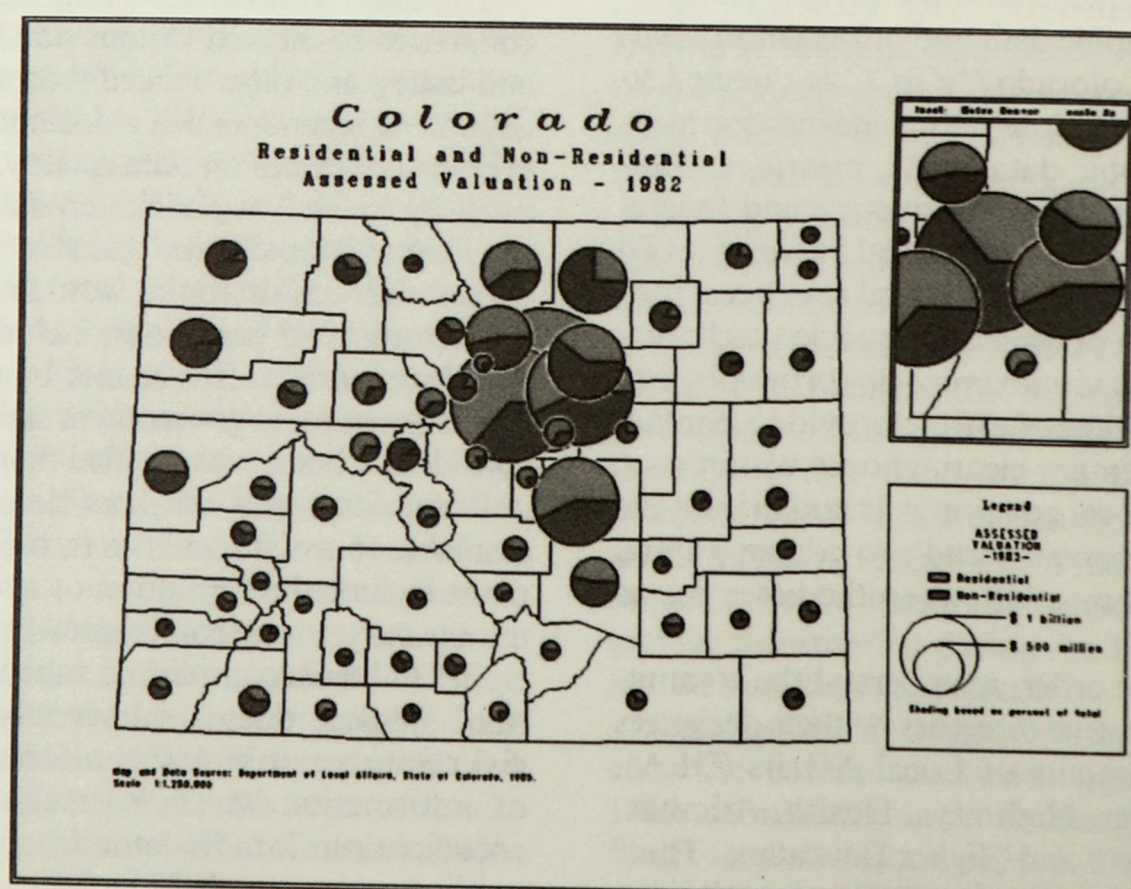
The potential for an electronic bulletin board for the geographic information community is being discussed. DLA's in-house bulletin board for

the agency is used by GICC members. GICC is also exploring the need for a statewide clearinghouse that may be either public or private. Plans are being made to make a presentation to policy-level officials, including IMC and the Legislative Council. GICC will present the results of work conducted so far along with results of survey efforts in its argument that the state needs to make resource commitments to make further progress regarding statewide geographic information coordination.

GIS in State Government

GIS activities in Colorado's state government are concentrated in the Departments of Local Affairs, Highways, Natural Resources, and Health, while many other agencies are expressing increasing interest in using the technology. The **Department of Local Affairs** (DLA) began using GIS in the Division of Planning in 1980 as a way to support redistricting for reapportionment needs (see **Origins of State Initiatives**). Soon thereafter, GIS activities were organizationally relocated and are currently performed by the State Demographer's Office in the Division of Local Government.

The system uses ARC/INFO software on a Prime 2755. It has an annual budget of approximately \$100,000 plus personnel costs. The system operated in the 1980s with less than two full-time staff positions, but an additional staff member was added in 1990 to support reapportionment needs. The system has been primarily used to support the division's needs for mapping, including helping



to maintain local government and special district boundaries to support property tax mill levy assessments. It is also used to accurately distribute Conservation Trust Fund monies received from the state lottery to local governments. Currently, the major effort is on supporting redistricting for reapportionment. Some contract work has been provided for other state agencies, such as developing a digital version of school district boundaries for the Department of Education, but these efforts have been minimal as such services have not been the objective of the system. The Senior Cartographer in the Office serves as the manager of the system and chair of the Colorado Geographic Information Coordinating Committee (GICC).

The **Department of Natural Resources (DNR)** is Colorado state government's umbrella natural resources agency. It is composed of autonomous divisions and boards, some of which have implemented a variety of GIS and automated mapping activities for programmatic purposes. Since the mid-1980s, DNR has been unofficially facilitating an agency-wide approach to GIS, but without resources dedicated to meet this need. At the department level, no staff or financial resources are currently applied to GIS, and in the divisions, GIS activities are conducted as part of program missions.

DNR's **Division of Wildlife** was the first user of GIS in Colorado state government, and one of the first state wildlife agencies in the country to use GIS. It began use in 1972 in preparation for the statewide wildlife plan, using 1:250,000 scale land use/land cover data from the U.S. Geological Survey as a base. The division identified distributions for over 60 species of big game, small game and furbearing species at this scale (see **Origins of State Initiatives**). Following this effort, GIS applications and data were integrated with other wildlife systems to create the Wildlife Resource Information System (WRIS). The division and the Colorado Cooperative Wildlife Research Unit at Colorado State University (CSU) wrote software to enable analysis of wildlife habitat information on CSU's Cyber mainframe computer. The primary developers of the software were the U.S. Fish and Wildlife Service in the 1970s and the National Park Service (NPS) in the 1980s, which was bundled into the public domain System Application Group Information System (SAGIS). NPS migrated SAGIS to UNIX-based work stations in 1988, and the division operates SAGIS on these at its Denver headquarters and at five regional offices, in addition to having dial-up access to CSU's Cyber. The division also uses ERDAS software, and recently obtained GRASS software for distribution to the regional offices for providing raster GIS processing capabilities at the regional level.

Funding support for the division's GIS efforts is approximately \$250,000, which is provided from licenses. Currently, the equivalent of 1.5 staff members in the headquarters office in Denver are working with GIS, and one person in each of the five regional offices is also working with GIS.

The Division of Water Resources initiated a satellite-linked water resources monitoring system in 1984, which provides real-time data on a continuous basis from key gaging stations across Colorado.

The system is used for wildlife habitat planning purposes at state, federal and local levels. The division is also in the process of integrating information from the Colorado Wildlife Species Database with data layers being developed by GIS to provide gap analysis. Gap analysis is used to develop predictive range maps for all vertebrate wildlife species. These range maps are used to analyze faunal bio-diversity. Additionally, land ownership information is used as an indicator of management potential. Collective use of the range maps and land ownership information with GIS can help to analyze gaps for ecologists in their attempts to manage biological diversity.

Composite maps showing significant wildlife habitats are provided for local government land use planning. For some counties, both hard copy and digital maps have been provided. Data transfers have been made with a variety of federal agencies. WRIS has provided information for use by the State Land Board, the Mine Land Reclamation Board, Colorado's Department of Highways (DOH), and other agencies; and it used base map information developed by DOH. The division is currently adding data to the 1:24,000 scale base map under development by DOH, and is working on a statewide vegetative layer. Recent, WRIS activities include the linkage of tabular data on aquatic resources to GIS, and the development of habitat classification data sets from satellite-based remote sensing data using ERDAS software.

The **Division of Water Resources** initiated a satellite-linked water resources monitoring system in 1984, which provides real-time data on a continuous basis from key gaging stations across Colorado. It is used to monitor and evaluate current hydrologic conditions. It is a primary tool for the state and its Division Engineers, and for Water Commissioners in water rights administration, hydrologic records management, flood warning and water resources management. Irrigation com-

panies are also using the system as a management tool. The computerized system can be accessed by terminal or phone from any location. The system began in 1984 with first-year funding of \$1.8 million provided by the Colorado Water Resources and Power Development Authority and approved by the legislature. Annual operating expenditures are approximately \$450,000, with half of these funds provided by user fees. Colorado is the only state in the nation operating a monitoring system of this type. It has received numerous awards, including recognition for completing one of the top ten projects of the National Society of Professional Engineers in 1985, and from The Council of State Governments' Innovations Program in 1986. The legislature authorized the division to initiate a groundwater information system with funding from permit fees, but decisions to fully implement such a system have not been finalized.

DNR's **Mined Land Reclamation Division** has an automated permit tracking system for active and inactive reclamation sites. It is also using a videographic analyzer to document, quantify and monitor disturbances at coal mines, as well as for performing bonding adequacy and reclamation at specific sites. This work is conducted with support from a U.S. Office of Surface Mining grant. The division also has a hydrologic database for the Yampa Valley that includes ground and surface water quantity and quality data compiled in cooperation with the U.S. Geological Survey's Water Resources Division and the Bureau of Land Management.

Other DNR divisions are also working with geographic information and automated mapping and related activities. The DNR's **Board of Land Commissioners** is using AutoCAD to assist in land inventory including boundary, topographic and geologic mapping. The board also has two textual systems including a royalty management system for the state's oil and gas wells, and a surface lease system for the state's four million acres of state-owned land. These systems are linked with the **Oil and Gas Commission's** tabular system, which includes oil and gas wells with locations based on the Public Land Survey System to support the well permitting process. The commission is funded to develop an oil and gas mapping system using AutoCAD software. This new system will be implemented in 1991 and uses the 1:24,000 base digital data developed by the Department of Highways. The **State Geological Survey** has a personal computer-based mapping system that helps to conduct analyses and create graphic displays. The Division of Parks is using AutoCAD for engineering design.

The **Department of Health's** Office of Health and Environmental Protection (OHEP) is respon-

sible for the state's environmental programs. OHEP operates the system known as "Kleros," which is a tabular database of regulated entities to support permit issuance, enforcement, and compliance of facilities and entities. The system is built on ADABAS software, and is supplementing systems in use by the U.S. Environmental Protection Agency (EPA).

Though no staff or resources are dedicated to GIS at OHEP or the Department of Health, an agency-wide approach has been under development since 1989. An analysis was initiated to consider development of an office-wide approach to GIS, resulting in the *GIS Needs Assessment and Implementation Strategy for OHEP* prepared by ESRI in March, 1990. The study includes an evaluation of potential integration of GIS with permit data contained in the Kleros system. Federal tax identification numbers in the system will be used as a reference for different systems to link with GIS and U.S. EPA systems that have a single point of data capture.

Previously, two divisions conducted pilot projects using GIS. In 1987, the **Water Quality Control Division** began a project to test the application of GIS to determine the vulnerability of groundwater resources in the Denver metro area, to show the impact of water quality on disease, and to plan and provide for groundwater management. The project used a modified form of the DRASTIC methodology developed by U.S. EPA and the National Water Well Association. Seven hydrologic parameters were evaluated for the study, including depth to water, recharge, aquifer media, soil media, slope of land surface, unsaturated media and hydraulic conductivity. Maps of geology, depth to water and soils associations were digitized, slopes were mapped from digital elevation data and recharge was estimated. Composite maps were generated by using GIS. Vulnerability map units were designated and described, including shallow groundwater resources. The **Disease Control Division** initiated a project to map the relationship between water quality and disease and this division is working with the Federal Center for Disease Control.

The **Department of Highways' (DOH)** Division of Transportation Development purchased ARC/INFO software in 1986 and operates the system on a microVAX. Funded with assistance from the Federal Highway Administration, the division currently has five staff members allocated for data and applications development. The DOH has an AUTOTROL system for engineering design applications, and is developing a GPS network.

DOH purchased 1:24,000 scale base maps from the Petroleum Information Company, and is in the process of updating this digital database with updated highway information maintained by the DOH. The system provides mapping support for transportation planning needs, and has produced surface condition reports and maps, traffic volume summaries, hazardous material route designation, and locations of deficient or obsolete bridges in combination with various tabular databases maintained by DOH. Plans are underway to develop an "electronic atlas" and to integrate GIS into transportation modeling. The database has been used by other agencies such as DNR's Division of Wildlife, which is using it as the base on which to add its other data.

Academic Activities

Academic activities in the state are concentrated in **Colorado State University**, which has remote sensing facilities and a GIS teaching laboratory in the School of Natural Resources. The **University of Colorado's** branches at Boulder, Colorado Springs and Denver have GIS capabilities in their Departments of Geography. GIS-related courses are taught at these universities. Denver Metropolitan State College has a four-year degree program in surveying.

4 Documents List

Directive

Executive Order D015089 **Colorado Geographic Information Coordinating Committee**, October 19, 1989.

This Executive Order established the Colorado Geographic Information Coordinating Committee to "promote a spirit of cooperation between state, federal and local agencies, and the private sector in addressing geographic data and information needs and services in Colorado." The order also stated that the responsibilities of the committee are to develop recommendations and guidelines on mapping and geographic data needs, priorities, standards, and data interchange to state and federal agencies; advise the U.S. Geological Survey of state priorities for use of federal resources; promote coordination of programs, policies, technologies and resources to maximize opportunities and minimize duplication of effort; provide a contact point and rudimentary clearing-house within state government for local governments and private entities with GIS concerns; provide recommendations to the governor as appropriate; and issue an annual report on or before each October 1. Members include executive directors or their designees from the Departments

of Local Affairs, Natural Resources, Highways, Health, Administration, Agriculture and Higher Education. Ex-officio members invited by the committee include representatives of federal agencies, local governments, other state agencies and the private sector. The order provided that the chair of the committee would be a representative of the Department of Local Affairs.

Publications/Reports

Colorado Geographic Information Resource Directory, Colorado Geographic Information Coordinating Committee, October, 1990.

This directory provides information about geographic information resources available to the public from some state, federal, county and city agencies, and academic institutions. The first section of the directory contains a profile on over 50 agencies with such resources. Information about each entity includes contacts and brief descriptions of any hard copy maps, aerial photography, digital data, and control or reference data. In addition, this section provides access information for each type of data. The second section contains a list that cross-references information sources with geographic themes, information on professional societies and publications, and a brief glossary. It also includes a copy of the survey used to collect information and a comment form.

The Colorado Satellite-Linked Water Resources Monitoring System: Annual Status Report FY 1989-90, 5th Edition, Office of the State Engineer, Division of Water Resources, November 7, 1990.

This report describes the Colorado satellite-linked water resources monitoring system, which provides real-time data on a continuous basis from key gaging stations across Colorado. It is used to monitor and evaluate current hydrologic conditions. It is a primary tool for the state and its Division Engineers, and Water Commissioners in water rights administration, hydrologic records management, flood warning and water resources management. Irrigation companies are also using the system as a management tool. The computerized system can be accessed by terminal or phone from any location. The system began in 1984 with first year funding of \$1.8 million provided by the Colorado Water Resources and Power Development Authority and approved by the legislature. Annual operating expenditures are approximately \$450,000, with half of these funds provided by user fees. Colorado is the only state in the nation operating a monitoring system of this type and it has received numerous awards, including one of the top ten projects of the National Society of Professional Engineers in 1985, and The Council of State Governments in 1986.

Report to the Governor, Colorado Geographic

Information Coordinating Committee, October, 1990.

This document is the first of annual reports required by the Executive Order which established the Colorado Geographic Information Coordinating Committee (GICC) in October, 1989. It includes a summary of progress during the year, including the work plans and accomplishments of four subcommittees. Appendixes include the Executive Order, member lists, the outline of a draft strategic plan, copies of the state's newsletter *GeoNews*, response to the U.S. Geological Survey's annual request for state input on mapping and digital data needs, and a list of written communications to the GICC.

GIS Needs Assessment and Implementation Strategy for OHEP (Colorado Department of Health's Office of Health and Environmental Protection), Environmental Systems Research Institute, Inc., March, 1990.

This document assesses the need for GIS in the Department of Health's Office of Health and Environmental Protection (OHEP) to manage, analyze and display data. It includes a review of applications opportunities, needs analysis and implementation strategy; of existing and potential hardware and data communications environment, and of short-and long-term recommendations. The report includes evaluation of potential integration of GIS with permit data contained in OHEP's KLEROS system, and of other non-graphic information systems in state and federal agencies.

State of Colorado: Governor's Forum on Geographic Information (Proceedings - October 6, 1987), Warnecke, Lisa, ed., January 14, 1988.

This report summarizes a conference held to understand and develop Colorado's geographic information needs, resources, activities and opportunities, and to promote partnerships and coordination between state, local and federal agencies, as well as academia and the business community. A major focus of the meeting was to determine the proper role for state government in geographic information coordination, and to encourage proactive efforts in response to growing recognition of redundant and incompatible activities. Speakers

included the Colorado Governor, directors of the Department of Highways and the National Mapping Division of the U.S. Geological Survey, as well as representatives from the State of Illinois and the City and County of San Diego. Speakers also represented state and federal agencies, local governments and the private sector. The report includes summary remarks from each speaker as well as summaries of geographic information activities in each of the sectors using geographic information in the state.

Paper

Evolution of the Colorado Division of Wildlife's Inventory System, Schrupp, Donald L., Division of Wildlife, Transactions of the Forty-seventh North American Wildlife and Natural Resources Conference, Portland, Oregon, March 26-31, 1982.

This paper describes the Colorado Division of Wildlife's efforts to develop the "Wildlife Inventory" as part of the division's long-range management plan for Colorado wildlife. The system was designed as a planning tool to facilitate data collection of wildlife population and to distribute information for use in a supply program to forecast future availability and use of wildlife resources. Supply-side figures were calculated by mapping species distribution on 1:250,000 scale maps that were digitized to obtain tabular listings of habitat area, and 1:500,000 scale computer-generated maps for each of 60 species and habitat. House Bill 1041, known as the Colorado Land Use Bill, was adopted in 1974 and accelerated these efforts with additional responsibilities. The system, including GIS capabilities and Landsat imagery and color-infrared aerial photography, became known as the Wildlife Resource Information System (WRIS). This paper reviews cooperative data development and applications projects undertaken during the late 1970s and early 1980s.

Newsletter

GeoNews, Colorado Geographic Information Coordinating Council and the Rocky Mountain Chapter of the Urban and Regional Information Systems Association, Published quarterly.